Update of Nutrient Threshold Development in New Mexico, 2013

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New Mexico Stream Work to Date

- **Developed a weight of evidence nutrient assessment protocol for streams - using threshold values for both cause and response variables.**
- **Using this protocol since 2002 to assess wadeable streams:**
  - **54 assessment units**
  - **962.22 miles**
  - **13% of all impairments / third leading cause**
- **TMDLs – 31 completed to date; 1 pending approval**
- **NPDES Permits with nutrient effluent limits have been developed – 8 current; more anticipated in the near future.**
  - **Ecoregional threshold values used as TMDL Targets**
  - **The limits in these permits are generally considered to be very low limits, among the lowest in the region.**
  - **NM is currently working on revisions to the WQMP that will include a path for "alternative" permit limits.**

Refinement of stream nutrient indicator thresholds

- The stream ecoregional thresholds currently in use are 50th percentiles of groups based on ecoregion and aquatic life use with no connection to use impairment

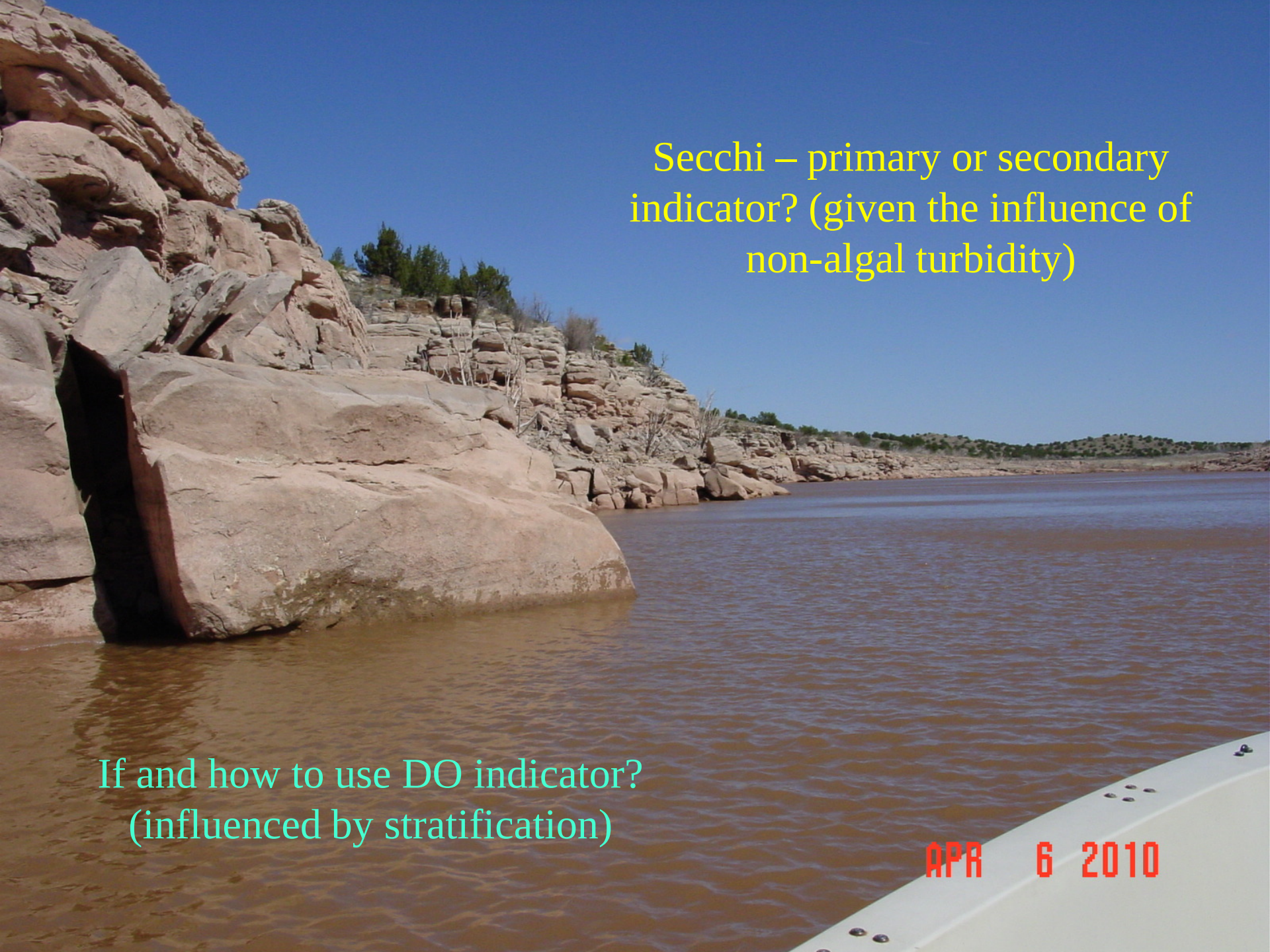
- We are about to under take another round of refinement of the stream thresholds
  - Examine stressor response relationships
  - Incorporate the benthic macroinvertebrate dataset
  - Look at stream metabolism as potential response variable
  - Define cause and response variable thresholds in a more robust way
  - Explore combining thresholds into trophic index

- Incorporate the revised threshold or index into refined nutrient assessment protocol

Lakes and Reservoirs

Lake and reservoir nutrient indicator thresholds

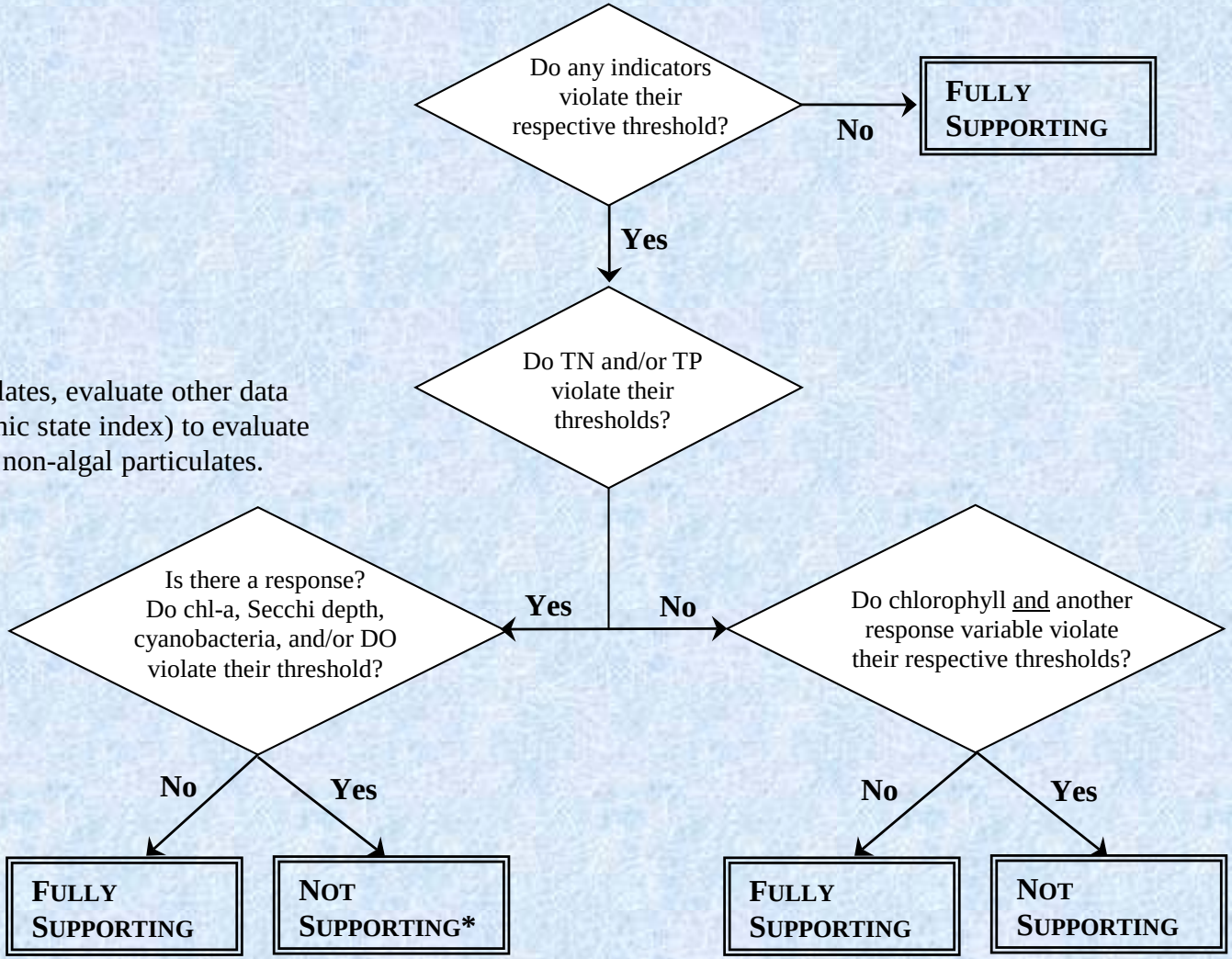
Designated Use / Lake class	Chl-*a* (mg/L)	Secchi Depth (m)	TP (mg/L)	TN (mg/L)	% Blue-Green Algae	Organization/Author	Method of threshold derivation
Coldwater candidate thresholds							
NM Coldwater ALU	2.3	1.5	0.03	0.5		NMED SWQB	Median of lake group
NM Coldwater ALU	6	3			21%	NMED SWQB	75th percentile of lake group
NM Coldwater ALU			0.04	0.9	38%	U. of Arkansas	Change point
ID Mountain	1.8		0.015	0.28		ID DEQ	75th percentile of reference
AZ Coldwater	5-15	1.5-2.0	0.70	1.2	>50%	Arizona DEQ	Trophic index
mesotrophic-eutrophic boundary	7.5	2	0.030	0.65		Nürnberg (1996)	Literature review & modeling
Warmwater candidate thresholds							
Warmwater ALU	3.2	1	0.04	0.6		NMED SWQB	Median of lake group
Warmwater ALU	10	1.8			31%	NMED SWQB	75th percentile of lk group
Warmwater ALU			0.04	1.41	38%	U. of Arkansas	Change point
ID Xeric	7.79		0.048	0.514		ID DEQ	75th of reference
AZ Warmwater	25-40	0.8-1.0	0.13	1.7	>50%	Arizona DEQ	Trophic index
KS Central Plains & SW Tablelands	11	1.2	0.044	0.70		KSU & KS Dept Health Env.	Median of best 1/3 (reference)
Sinkhole candidate thresholds							
Sinkhole lakes		6	0.025	1.42		NMED SWQB	75th percentile lake group
oligotrophic-mesotrophic boundary	3.5	4	0.01	0.35		Nürnberg (1996)	Literature review & modeling


Secchi – primary or secondary indicator? (given the influence of non-algal turbidity)
If and how to use DO indicator? (influenced by stratification)
APR 6 2010

TWO AQUATIC LIVE USES	Station Name	Sample_ Date	Secchi Depth (M)	Chloro phyll_ A	Percent of depth below criteria	Ave. DO of top 3m (mg/L)	% Blue-greens	1/2 DLTP - Total Phos (mg/L)	TN - Total Nitrogen (mg/L)
CWAL	Bonito deep - 57BonitoLakeD	06/25/03	2.9	5.11	63	6.95	7.6	0.02	0.38
CWAL	ABIQUIU RESERVOIR AT THE DAM - 29AbiquiuRDam	04/28/99	3.6	1.17	0	8.65	0	0.025	0.27
CWAL	ABIQUIU RESERVOIR AT THE DAM - 29AbiquiuRDam	09/02/99	5	0.09	58	6.35	0	0.005	0.2
CWAL	ABIQUIU RESERVOIR AT THE DAM - 29AbiquiuRDam	11/03/99	0.8	1.4	38	8.03	0	0.005	0.32
CWAL	ABIQUIU RESERVOIR AT THE DAM - 29AbiquiuRDam	04/11/07	1.5	0.28	0	10.13	0	0.015	0.249
CWAL	ABIQUIU RESERVOIR AT THE DAM - 29AbiquiuRDam	07/24/07	5	1.07	98	5.96	10	0.017	0.212
CWAL	ABIQUIU RESERVOIR AT THE DAM - 29AbiquiuRDam	11/06/07	0.6	1.34	89	5.82	14	0.022	0.53
CWAL	ALTO LAKE - 57AltoLake	08/12/97	1	7.84	0	9.95	0	0.045	0.54
CWAL	BLUEWATER LAKE AT DAM - 36BluWaterLk@D	04/20/04	0.7	9.97	0	7.06	0	0.0326	0.936
CWAL	BLUEWATER LAKE AT DAM - 36BluWaterLk@D	07/14/04	0.35	28.4	43	9.48	99.3	0.0456	1.88
CWAL	CANJILON LK #1	08/06/07	7	1.74	0	9.02	0.6	0.035	0.71
CWAL	DULCE LAKE DEEP - 64DulceLkDp	05/10/94	4.3	2.2	9.7	9.7	0	0.045	0.75
CWAL	DULCE LAKE DEEP - 64DulceLkDp	07/19/94	3.3	3	7	9.12	53.3	0.045	0.85
CWAL	DULCE LAKE DEEP - 64DulceLkDp	10/25/94	4.5	1.68	7.75	8.02	3.6	0.045	0.82
CWAL	EAGLE NEST LAKE DEEP 01 - 05EagleNestDP	04/01/98	2.4	2.8			0.9	0.04	0.5
CWAL	EAGLE NEST LAKE DEEP 01 - 05EagleNestDP	07/21/98	3.25	2.06	71	7.2	15.8	0.025	0.35
CWAL	EAGLE NEST LAKE DEEP 01 - 05EagleNestDP	10/27/98	1.9		25	7.71	18.7	0.058	0.664
CWAL	EL VADO RESERVOIR AT 200 M FROM CENTER OF DAM - 29ElVadoResDP	04/15/98	0.9	2.62	0	9.6	0	0.015	0.728
CWAL								8	0.24
CWAL								7	0.321
CWAL								9	0.1
CWAL								5	0.78
CWAL								5	0.15
CWAL								5	0.39
CWAL	GRINDSTONE CANYON RESERVOIR DAM - 57GrindCanRes	08/11/97	1	0.841	41	7.42	0	0.005	0.575
CWAL	GRINDSTONE CANYON RESERVOIR DAM - 57GrindCanRes	06/25/03	1	0.47	78	7.05	0	0.015	0.82
CWAL	HERON LAKE DEEP DAM - 29HeronLDpDam	05/16/07	0.8	2.34	6	7.79	3.3	0.018	0.291
CWAL	HERON LAKE DEEP DAM - 29HeronLDpDam	09/26/07	3.9	0.37	70	6.82	6.7	0.0154	0.1
CWAL	HERON LAKE DEEP DAM - 29HeronLDpDam	11/07/07	1	0.37	100	5.94	12.2	0.024	0.31
CWAL	HOPEWELL - 29HopewellLk	08/06/99	1.15	7.85	0	7.78	0	0.06	0.44
CWAL	LAKE MALOYA DEEP DAM - 04LMaloyaDeep	04/11/06	1.5	6.63	0	8.88	3	0.015	0.51
CWAL	LAKE MALOYA DEEP DAM - 04LMaloyaDeep	07/25/06	3.75	1.92	56	6.49	31.7	0.035	0.76
CWAL	LAKE MALOYA DEEP DAM - 04LMaloyaDeep	10/03/06	1.5	3.23	57	7.63	87	0.1	0.58
CWAL	LAKE ROBERTS @ dam - 77LRobertsDam	04/16/96	2.3	8.5	0	9.3	17.4	0.045	0.55
CWAL	LAKE ROBERTS @ dam - 77LRobertsDam	07/16/96	1.5	74.01	57	6.4	4.7	0.045	0.75
CWAL	LAKE ROBERTS @ dam - 77LRobertsDam	10/22/96	1.5	15.42	0	8.1	50.1	0.03	0.45
CWAL	MAXWELL LAKE #12 DEEP DAM - 04MaxLk12Deep	04/19/06	1	1.03		8.47	45	0.06	1.36
CWAL	MAXWELL LAKE #12 DEEP DAM - 04MaxLk12Deep	08/09/06		2.06		7.8	17.3	0.015	1.35
CWAL	MAXWELL LAKE #13 DEEP DAM - 04MaxLk13Deep	04/19/06	0.5	1.12		9	14.7	0.077	1.23
CWAL	MAXWELL LAKE #13 DEEP DAM - 04MaxLk13Deep	08/09/06	2.2	13.3	0	10.31	81	0.089	0.85
CWAL	MAXWELL LAKE #14 DEEP - 04MaxLk14Deep	04/19/06	1	0.75		7.18	48	0.069	2.03
CWAL	MAXWELL LAKE #14 DEEP - 04MaxLk14Deep	08/09/06	2.5	1.87	0	10.44	9	0.028	0.68
CWAL	Middle Fork Lake - 28MiddleForkD	08/01/07	3.3		0	6.1	22.7	0.026	0.46
CWAL	Nambe Lake (Cirque) - 28NambeLakeDp	08/23/07	1.5	2.52		7.23	7.9	0.011	0.67

How to deal with situations with no causal variable exceedences but many response variable exceedences ?

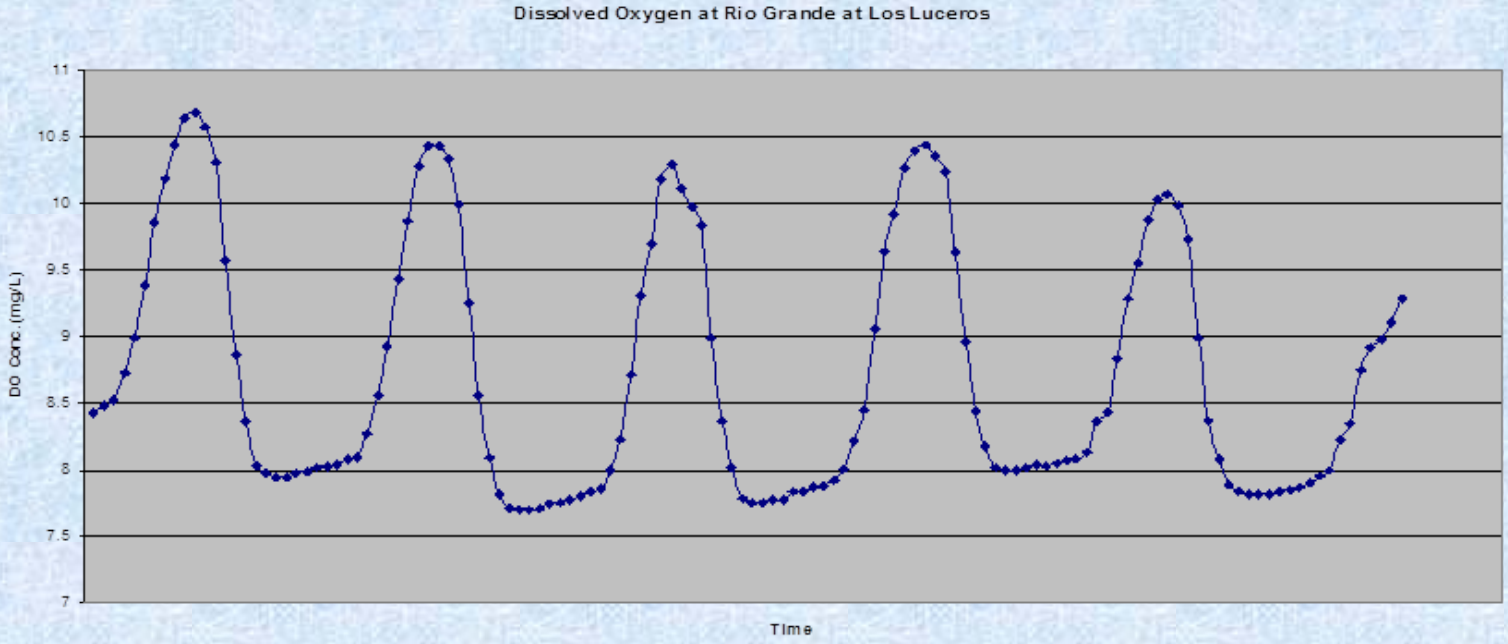
Weight of evidence approach to lake and reservoir assessments (2014 Listing Cycle)



* If *only* Secchi depth violates, evaluate other data (e.g. Forel Ule color, trophic state index) to evaluate if turbidity is the result of non-algal particulates.

Next steps for large river thresholds

- ❑ compile benthic macroinvertebrate metric data and analyze with other nutrient variables
- ❑ compile stream metabolism data and analyze with other nutrient variables
- ❑ incorporate the resulting thresholds into a weight of evidence assessment protocol



General Approach

- New Mexico has undertaken an effective approach to address nutrient impairments through application of our narrative standard

- SWQB will continue to use the threshold values in assessment protocols to identify nutrient impaired waterbodies and implement nutrient control strategies

- Without significant increase in federal funds, SWQB will not pursue the development and adoption of numeric nutrient criteria

- If adoption of nutrient criteria is undertaken in the future it will likely follow the approach of Maine and Ohio where both cause and response variables are incorporated into the criteria or a trophic index

Questions?

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